Wind for Schools
Program Overview - Nebraska Update

Dan McGuire, NE NREL-WFS Facilitator

Presentation to

Nebraska Wind Power 2009 - Kearney November 10, 2009

WFS Program Developed by NREL/WPA

Larry Flowers, Ian Baring-Gould and other NREL Staff

School Wind Projects: Most Common Models

- Purchase green tags
- Buy a portion of the output of a utility-scale wind project
- Small turbine on the school grounds (behind the meter) offsets electricity costs
- Larger turbine powers a school, with excess electricity sold to local utility
- School lands leased to wind farm developers
- Payments by developers to school funds in lieu of taxes
- **Install small wind or wind/solar system primarily for educational purposes**

Penn

Spirit Lake, IA

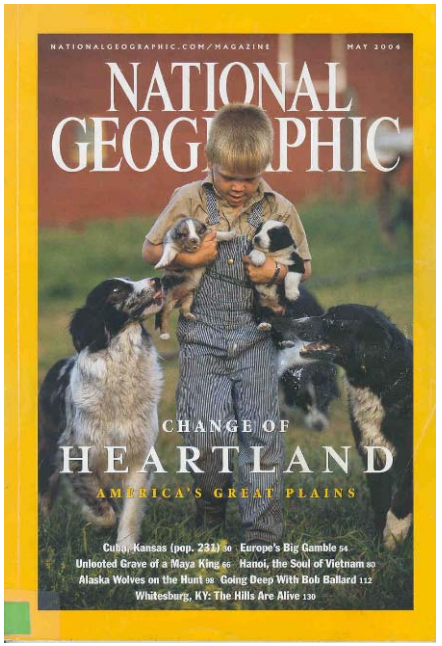
Mount Holly, VT

U. Of Colorado

Project Objectives

- ***Engage rural America in the concept that wind offers an alternative energy and economic future for rural America***
- ***Engage rural school teachers and students in energy education, specifically wind***
- ***Equip college juniors and seniors in wind energy applications and education to provide the growing U.S. wind industry with interested and equipped engineers***

Long-term economic development in rural areas is tightly linked to schools



20% energy from wind will require on the order of 2,750,000 FTE job years over a 20 year project life

– We need to start training the people who will make this happen

We hope to meet these objectives by installing small wind turbines at K-12 schools in rural communities with the help of local institutions of higher education

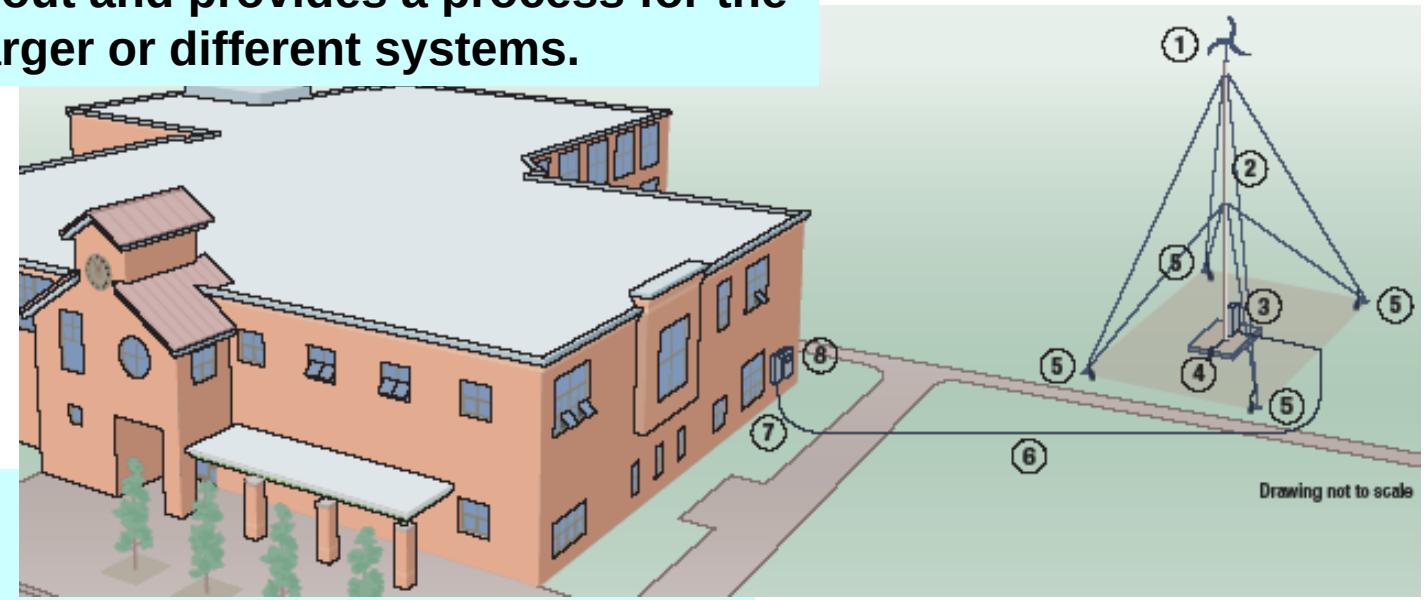
Project Approach

- Low-cost replicable system
- Assist community and local utility to implement a sustainable school wind project
- Work with AWEA/NEED on K-12 curriculum
- Build in-state capacity to provide technical assistance for community-scale projects
- Work with State Universities on college-level program and curricula
- Work collaboratively with all community organizations to implement successful projects

Tilden, Nebraska

Power System

Initially envision using a standard system package, but could branch out and provides a process for the use of larger or different systems.



Components of Standard System

1) SkyStream 3.7, 1.8-kW wind turbine
2) 70-ft guyed tower
3) Tower/turbine base fused disconnect and junction box
4) Turbine foundation including tower base electrical grounding
5) Tower guy wire foundations and electrical grounding
6) School electrical connection
7) School disconnect and junction box
8) School's electrical power meter or interconnection point

SKYSTREAM 3.7™
www.skystreamenergy.com
Southwest Windpower
Renewable Energy Made Simple

State Facilitators

In-state person with knowledge of local issues and organizations to engage with the variety of stakeholders needed for successful school projects

- Engage with the variety of stakeholders needed for successful school projects: community, school, science teachers, local co-op/utility, WAC, NREL
- Help assemble financial package that will work
- Goal: Install 3 to 5 systems per year at rural schools
- Assist in the development of the Wind Applications Center

Colorado: **Tom Potter**, All American Energy

Idaho: **Brian Jackson**, Renaissance Engineering

Kansas: **Dan Nagengast**, Kansas Rural Center

Montana: **Mike Costanti**, Matney-Frantz Engineering

Nebraska: **Dan McGuire**, American Corn Growers Foundation

South Dakota: **Steve Wegman**, SD Public Utilities Commission

Wind Application Centers

Establish a training and implementation center to educate engineers in wind applications and analysis:

- Modeled after the DOE Industrial Application Center
- Develop a long-term program on wind energy applications; NREL/DOE will help for first 3 years but additional funding will be need
- Provide data analysis, technical assistance, implementation support for Wind for Schools Program
- Become the “go-to place” for technical assistance for school and community wind
- Train engineers to enter the wind marketplace/industry

Colorado State University
Boise State University
Kansas State University
Montana State University
University of Nebraska, Lincoln
South Dakota State University

NREL / DOE

Supply organization, oversight, financial assistance, and training to state organizations implementing Wind for Schools projects

- Provide initial/seed funding for the Wind Application Center (3 years)
- Provide funding for the State Facilitation (3 years)
- Host a yearly week long training program at NREL on wind applications
- Assist in the identification of candidate schools and final school assessment (resource analysis, siting and interconnection, installation guidance etc)
- Support the development of wind specific energy curricula
- Development of project documentation, legal information, and other logistical support

Education Curricula:

- Work with partners (e.g. NEED, KidWind) to develop K-12 Curricula incorporating data from the wind turbine for projects
- Development of college curriculum with WACs

Project Finances (potential example)

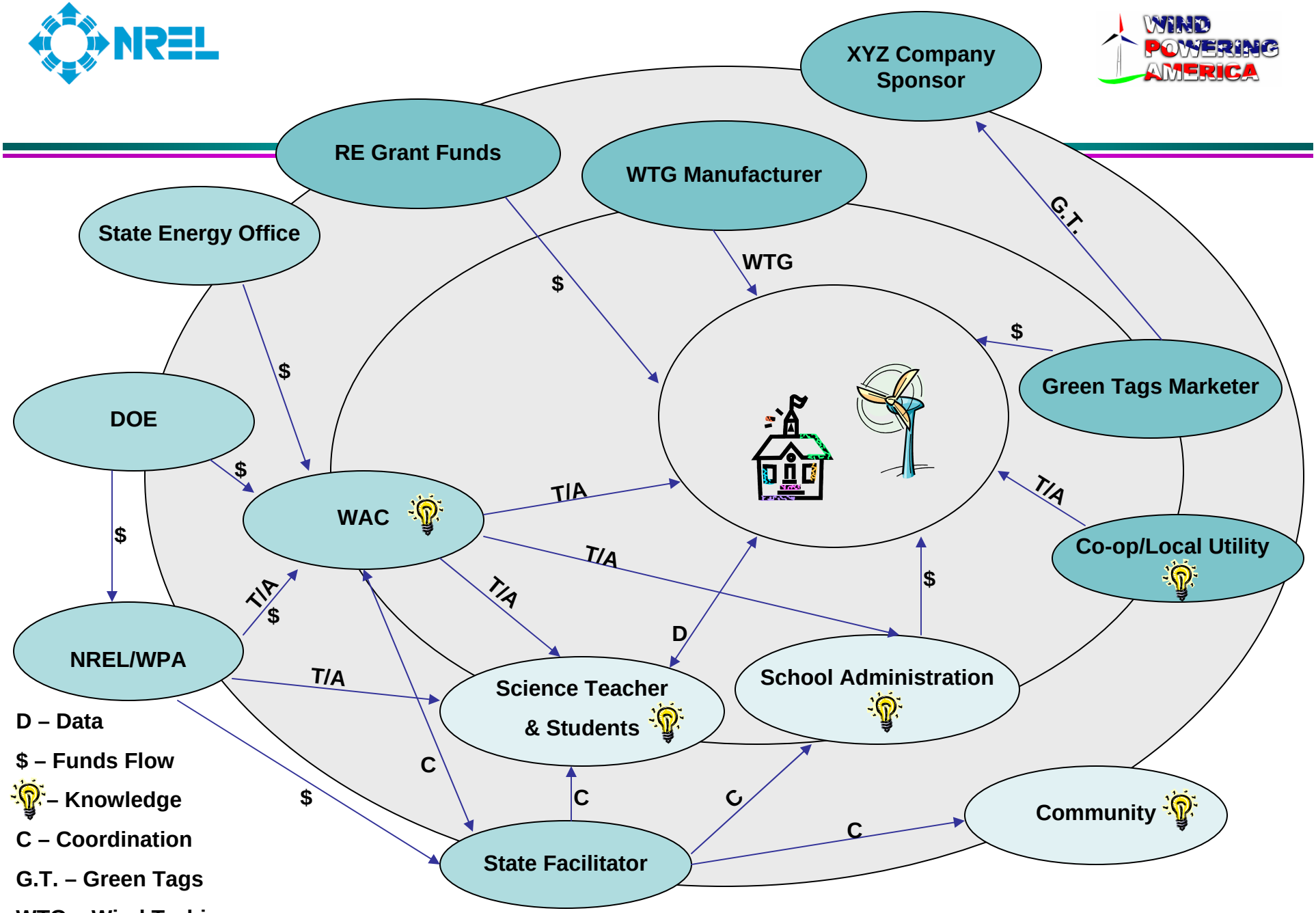
Sample financial arrangement (monopole tower)

- Reduced total system cost **~$18,000 (estimate)**
- $1,500 required from the school budget
- $1,500-$3,000 possibly from NPPD (as has been the case to date with WFS partner schools)
- $1,000 from local community foundation or donor
- $2,000 possible donation for lifetime green tag value
- $5,000 potential grant source (NEO via UNL-WAC)
- $7,000 potentially from USDA-RBEG Grant
- In-Kind work can be provided by local utility (such as trenching, wiring, bucket trucks, etc.) or others

Skyline High School, Idaho

Payback - The real payback is in the education

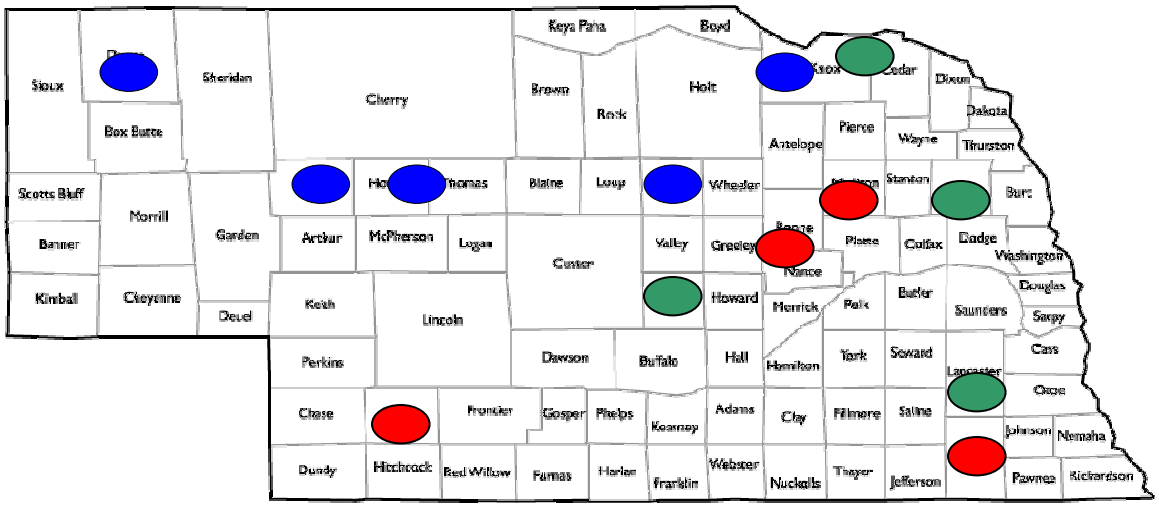
- Skystream @70ft in a class 3 wind resource will produce about 6000 kWh/year
- At a retail rate of $0.05 / kWh this amounts to ~$300 per year in reduced energy costs
- Simple payback to school ~5 years


XYZ Company Sponsor
RE Grant Funds
WTG Manufacturer
State Energy Office
G.T.
WTG
$
$
$
$
$
$
$
$
DOE
Green Tags Marketer
WAC
T/A
T/A
T/A
T/A
T/A
T/A
Co-op/Local Utility
NREL/WPA
D
Science Teacher & Students
School Administration
C
C
C
C
State Facilitator
Community
D – Data
$ – Funds Flow
– Knowledge
C – Coordination
G.T. – Green Tags
WTG – Wind Turbine
T/A – Technical Assistance

1st 4 NE WFS Partner Schools

2nd Group of 4 WFS Partners

3rd Group of Expected/Potential Partners



Diller-Odell Public Schools Skystream at Odell Location

Skystream turbine at Hayes Center Public Schools-Spring 2009

2nd Round WFS Partner school Principal Lingenfelter assisting with site evaluation at Bloomfield Community Schools

Brancroft-Rosalie Community Schools Supt. Cerney and other school official help with site evaluation during Facilitator site visit (2nd Round Partner School)

UNL-WAC's Hudgins & Jacobs measure cable run at Loup City with McGuire & Supt. Winchester (2nd Round WFS Partner) in Nov. 08

Hyannis Area Schools (3rd Round WFS Partner) during Facilitator site visit/presentation to school bd.

Site visit by McGuire at 3rd Round Partner Crawford Public Schools in Spring of 2009 with Supt. Dick Lesher, Science Teacher, NPPD Official and Northwest Rural Public Power Representative

Dr. Hudgins (UNL-WAC) with Skystream at briefing of four NE WPS Supt.'s & USDA (Supt. Malander-Cedar Rapids examines turbine)

Lyle Kathol, Dean of Applied Technology at Northeast Community College in Norfolk discusses new Wind Technician Course with Wind Advisory Committee Members

L-R: EVS Supt. Navratil; D. McGuire-WFS Facilitator, R. Byrnes-NREA; D. Patterson–UNL-WAC; Dean Kathol, NECC during NECC Wind Technician Advisory Committee Planning Mtg. in Norfolk

USDA Rural Development Officials Discuss Grant Reporting Procedures with 2nd Round WFS Partners at UNL-WAC

Thank you Public Power & Govt. Partners

- Thank you to **NPPD Management and the NPPD Board of Directors** for supporting the Wind for Schools program and moving it forward, Thank you **Southwest Public Power District** for your help with the Hayes Center Public Schools project
- Thank you **Loup Public Power District** for your support and help with the Cedar Rapids Public Schools project
- Thank you **Norris Public Power District** for your help with the Diller-Odell Public Schools project and the UNL-WAC initial Skystream system and Norris Public Schools project at Firth
- **Northwest Rural Public Power District** with Crawford Public Schools
- **Panhandle Rural Electric** Marketing Association with Hyannis Schools
- Thank you **USDA Rural Development** for the grants in support of all of these projects
- **Nebraska Energy Office** for their ARRA funding & other support
- **University of Nebraska Wind Applications Center**
- **A big Nebraska Thank You to NREL-DOE and Wind Powering America for making Nebraska a Priority WFS State**

Thank you to Nebraska Businesses/Others Supporting First-Round Wind for Schools Projects

Elkhorn Valley Schools-Tilden

- Rutjens Construction Company
- Eymann Electric
- Carhart Lumber
- NUCOR Steel
- Nebraska Public Power District
- USDA Rural Development Grant

Cedar Rapids Public Schools-Cedar Rapids

- Choyeski Concrete out of Belgrade
- Electrical Specialist out of Columbus
- Loup Public Power District
- USDA Rural Development Grant

Thank you to Nebraska Businesses/Others Supporting First-Round Wind for Schools Projects

Hayes Center Public Schools-Hayes Center

- Bill Rogers dirt work
- KC motors-electrical
- Burke Construction - concrete
- Southwest Public Power
- USDA Rural Development Grant

Diller-Odell Public Schools-Odell

- Lottman & Carpenter Construction
- Beatrice Concrete
- Homesteader Electric of Beatrice
- Diller-Odell FFA assembled foundation kit
- Norris Electric & Public Power District
- USDA Rural Development Grant

Carpe Ventem

http://windpoweringamerica.gov

Click on Schools under Program Areas